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Contour STRIP-CROPPING

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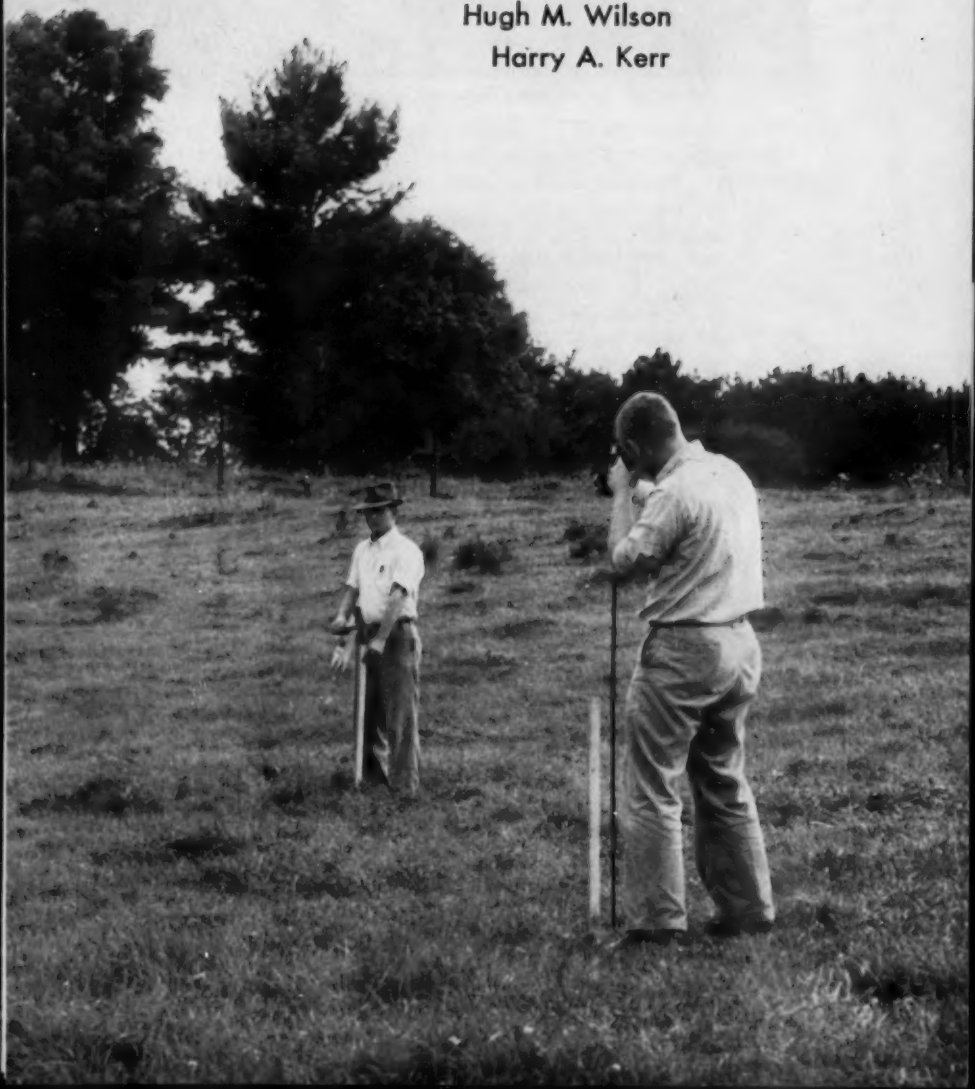

Gulley and sheet erosion

FOREWORD

THIS bulletin is written to show how, when, and where strip-cropping is established, so little mention is made of the many other devices used to control the movement of soil and water. A combination of treatments is, however, usually needed to prevent erosion. Some of the more important practices are listed and described briefly on pages 12 to 15. It is suggested that you read these pages before you lay out any strip-cropping.

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Contour Strip-Cropping

By
Hugh M. Wilson and Harry A. Kerr

WHY does soil erode? Isaac Newton answered that question when he discovered the law of gravity, because everything moves downward unless solidly supported. Soil saturated with water is a semi-liquid and moves easily. On sloping, unprotected land, runoff water is a swift, destructive force that carries tons of fertile soil with it. Oftentimes, the loss of the rainfall in runoff is as serious as that of the eroded soil.

If you could keep all of your cropland in sod, the problem of soil and water losses would be solved, because soil covered with vegetation is "anchored in the grass roots." You must, however, plow the land to raise food crops and to reseed meadows.

What Is Strip-Cropping?

CONTOUR strip-cropping is a compromise between plowing a field and leaving it in sod. It consists of plowing every other strip on the contour and leaving alternate strips in close-growing crops until the plowed strips are reseeded. With these level furrows and rows, runoff is checked and water is held on the land for use by the crops. Sod strips below plowed land catch soil or water from the open land. Grain is sometimes used in place of sod but it is less effective.

Strip-cropping may be practiced to advantage on almost any fields

Strip-cropping

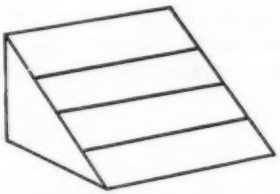
suitable for plowing. On fields with irregular or steeply rolling topography, it may be impracticable to follow the exact contour, but you can lay the strips across the general slope. This practice is, however, far less effective than contour strips and should be done only when there is no better way. With small or ill-shaped fields, you may remove hedgerows or relocate fences to obtain longer strips.

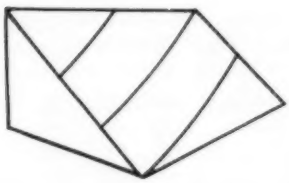
With good fertile soil and a good crop rotation, strip-cropping usually controls erosion on moderately steep slopes up to 500 feet in length. On longer slopes, on wet soils, or on intensively cultivated fields, diversion terraces may also be needed. Wet and dry soils should not be combined in one strip, because farming operations would have to be delayed until the wet areas were dry enough to work. Strip-cropping usually increases crop yield.

Examples of Strip-crop Layouts

Example 1

The field extends to the top of the hill, and the moderately steep slope is 400 feet long. The east and west ends of the field are of even elevations. The rotation is corn, grain, and two years of hay. Therefore, to divide the slope into four equal-width strips should control erosion.



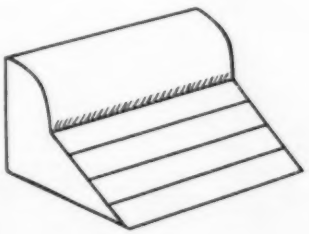


Example 2

Here the west edge of the field is higher than on the east. To follow the contour, make the strips diagonal. Fences might be changed to include the odd-shaped corners with other cropland or pasture. Other fields may be combined with these strips to provide longer bouts.

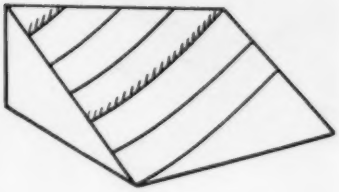
Example 3

Here the cropland does not extend to the top of the slope, and runoff and seepage from the upper area are a problem. Therefore, a diversion terrace is needed to protect and improve the cropland below. Survey the diversion line before you lay out the strips and run the top strip boundary parallel to the terrace line.



Example 4

The field is 900 feet long, with the west side higher than the east. The soil is imperfectly drained, and water drains from a higher field. A diversion terrace is, therefore, needed near the top of the field and another diversion about 400 feet below the first. Here also, survey the diversion terraces and, if possible, construct it before you establish the strips.



Equipment Used to Lay Out Strips

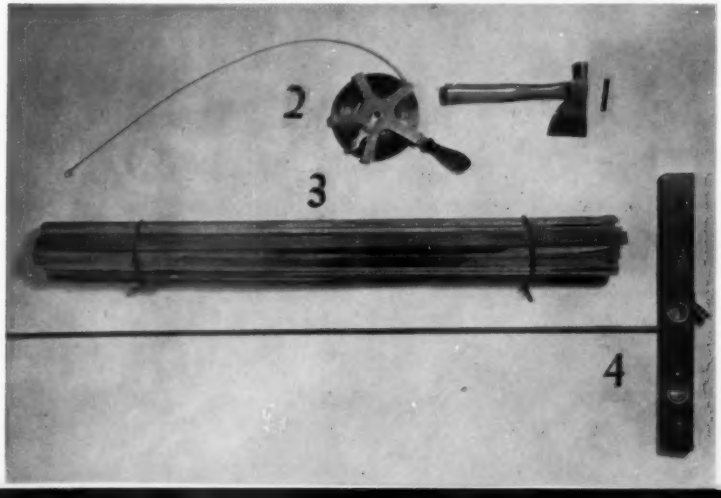
A CARPENTER'S level equipped with a mirror may be used to lay out contours. Set the mirror at a 45-degree angle about ¼ inch above the level. Support the instrument at eye height with a rod or pole. Sight along the instrument—you can see both bubble and target—to tell when your helper is standing at a spot level with your own location.

Usually you can buy a reasonably priced "Locke" or hand level at most hardware stores. This may be more convenient than a carpenter's level and, if you have many contours to establish, its cost will be justified.

Ten or more stakes are needed for 1000 feet of contour. Lath make excellent stakes or you may use narrow boards. Usually, after you have established three or four strip boundaries, you may mark the lines by a shallow plow furrow and then pull up and use the stakes again. If you sharpen the stakes, you may drive them in with a light hammer or hatchet.

A steel tape is best to lay out parallel-sided strips. You may use a cloth tape or light rope in dry weather but it stretches when moist.

Tools for strip layout: 1, hatchet; 2, tape; 3, stakes; 4, carpenter's level with mirror



Strip width depends on the equipment to be used in the field

Width of Strip

IN THEORY, strips should be narrower on a steep slope than on a more gently sloping field. In practice, however, most strips are about 100 feet wide. This width is convenient for farming equipment and, with other needed measures, usually controls erosion.

The exact width is determined by the spacing of the cultivated crop rows and by number of rows required to make a complete round with farm equipment. The following examples show how to determine strip width.

On a general farm:

Principal cultivated crop	corn
Distance between corn rows	3 feet
A strip 32 corn rows wide	$32 \times 3 = 96$ feet
Add 2 feet for ease of operation	$96 + 2 = 98$ feet

On a specialized potato farm:

Distance between rows	= 32 inches, or 2 2/3 feet
10-row sprayer used, then 20 rows	= 1 round trip
1 round trip $20 \times 2\ 2/3$	= 53 1/3 feet
2 round trips $2 \times 53\ 1/3$	= 106 2/3 feet
add 1 1/3 feet for ease of operation	= 108 feet

Establish the Base Line

IN a strip-cropping plan, the first task is to lay a base line for the strips. This is laid along the slope at a place that is representative of both the slope and the topography. Usually, but not always, the base line is slightly above the middle of the field.

Establishing the base line

In fields where you plan to have diversion terraces, or where you have already built them, use the lines of the diversions as base lines for the contour strips. Under most conditions, strips laid parallel to the diversions are close enough to the contour.

The illustration above shows the beginning of the base line. The first stake has been set and the man carrying the stakes has paced about 35 steps out into the field. The instrument man is sighting along the stake man's shoulders, since they are about the same height from the ground as the top of the instrument. In this instance, the stakeman misjudged the location and the instrument man will motion him to move up hill. When the right spot is determined, he will set a stake and then the two men will move forward and repeat the operation.

Locate the levels and set the stakes entirely across the field. Contour lines are seldom straight; since the objective is to follow the contour, the base line is seldom straight. Usually, stakes are set about 35 steps apart, but should be closer on sharp curves.

After you stake the line, you may need to smooth abrupt curves. If so, move a few stakes up or down hill, provided this can be done without getting too far off the contour. Small dips and knolls may make a grade between stakes; but, even though these are fairly steep, they will cause little damage if they are short. Any deviation of more than 1 per cent (1 foot fall in 100 feet) from contour should, however, be corrected if it extends for more than 100 feet. Failure to do this permits water to run down the rows, concentrate, and cause erosion.

If there is a pronounced depression or gully from the top to the bottom of the slope, it may be advisable to plan a sod waterway and to run the strips straight across the depression.

Step 1 in establishing the right angle. Note the position of the man's arms

Measure Strip Boundaries from Baseline

WHEN the base line is completed, measure the other strip boundaries from it. To do this: hold one end of the tape and stand by a stake in the base line, have another person hold the other end of the tape, and set a stake at the desired strip width (usually about 100 feet). Repeat this procedure until the second row of stakes is set across the field.

The second row of stakes must now be checked to be sure that the line is close enough to the contour. If not, you must readjust the stakes up or down hill even though this means an uneven-width strip. If, however, the base line is in the right place, it usually is possible to lay out several strips before laying out a new base line. Occasionally, to stay on the contour when one end of the field is steeper than the other, it may be necessary to make one part of every strip wider than the rest. Always have as few uneven width strips as possible. When a "correction strip" is needed, keep it in long-term hay.

When you use a diversion terrace line as the base, make the strips above and below the terrace 25 feet wider to allow room for the diversion and sod-filter strip.

Measure Strips at Right Angles

MEASURE the strips at right angles to the stake line to insure uniform width. It is not easy to determine the right angle when you stand in the middle of a curving line of stakes. In the illustration above, the man is pointing one hand at the stake at his right and the other hand at the stake at his left to align himself.

He next brings his arms together. His hands are now pointing at right angles to the stake line and he can instruct his helper to move right or left as needed.

Step 2 in establishing the right angle. Note the position of the man's arms

Finish Marking the Strips

LAY additional strip boundaries above and below the base line until you have established all of the desired strips. Check each line to be sure it is close enough to the contour and whether adjustments are needed. Should a third man be available, have him check the stakes as they are set.

Usually, not more than four parallel strip lines can be safely measured from one base line. As this is the commonly recommended spacing for diversion terraces, a new terrace line can be surveyed and used as a new base line. Then any correction strip can be included in the sod-filter area above the terrace channel. As soon as you have established the lines, mark them with a plow furrow and remove the stakes.

Sometimes only the base line is staked and parallel lines are measured and marked with the plow in one operation. To do this, have someone hold one end of the tape and follow the base line while a second person

Completing the layout

keeps the tape taut and walks along the slope on the next strip boundary closely followed by the plow. It is difficult to keep on contour with this method, so use it only where the topography is uniform.

When to Establish Strips

SELDOM is it desirable to change an entire farm layout in any one year, so decide when and where to start.

For best results, plan your cropping system several years in advance and decide which fields will be newly strip-cropped each year. Careful planning makes it unnecessary to plow new seeding, to leave old sod too long, to plow the entire fields after strips have been established, or to have only one corn strip in widely separated fields.

Following are examples of when to establish strips in the rotation:

Field in sod

Plow alternate strips after an early crop of hay is harvested. Plant corn in the plowed strips and the next year plant grain and then reseed. Thus it will be necessary to keep the old sod strips in hay for three years only, then you may plow them.

Field in corn

Seed alternate strips with wheat and the following spring replant corn on the remaining strips.

Field in grain

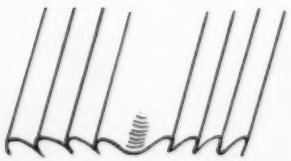
Seed alternate strips and the following year plow unseeded strips for corn.

Other field arrangements

Other field arrangements are similarly handled. If strips are established on old sod that would otherwise be plowed, top-dress the remaining sod strips. When corn is to be replanted on the same land, sow a winter cover crop and apply manure to provide surface mulch and organic matter.

How to Work Strip-Crop Fields

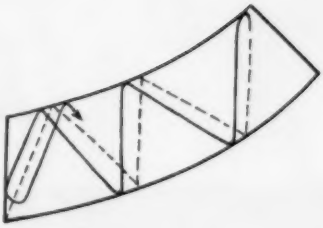
Plowing

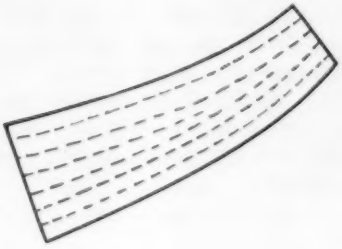


In plowing a strip the first time, plow "out" so the dead furrow is in the middle. The second year, turn a back-furrow in the center of the strip and plow "in." This alternate "out-and-in" plowing prevents building a ridge on the boundary or center of the strip.

Harrowing

To cross-harrow a strip, drive diagonally back and forth across it as shown in the sketch. The only complete turns are on the ends; therefore, no time is wasted in zig-zagging. Follow a parallel course on the return and succeeding trips so, when the entire area is covered, it has been harrowed twice.





Planting

On uneven-width strips, plant row crops so all short rows are in the middle. This saves time in cultivating and harvesting because no "deadheading back" is needed. Little damage is done when turning in the middle of the field to cultivate the short rows.

Harvesting

Since hay is usually harvested before grain or row crops, and cutting a backswath in hay is easy, hay between strips of cultivated crops or grain is no disadvantage.

Grazing

Pasturing strip-crop fields varies with the crop rotation. With a rotation of corn, grain, and four years of hay, a block of strips is in sod two years out of six, so one-third of the cropland is open for aftermath grazing in any given year.

With a four-year rotation of corn, grain, and two years of hay, alternate strips are plowed each year. Topdressing new seeding with manure after the grain is harvested permits grazing both hay and grain strips because cattle shun the manured areas.

For pastures, electric fencing is used for the sod strips between the corn strips. The amount of fence needed is reduced by arranging the rotation so the strips either side of a diversion terrace are in the same crop. Labor used in building an electric fence is worth while because most forage is obtained by grazing a limited area heavily then moving cattle to another strip.

You Always Need

Good soil structure

Soil with good structure is granular, easy to work, absorbs water readily, and does not become puddled, crusted, or compacted. To obtain good soil structure, include plenty of grass and clover in the rotation and add organic matter such as manure.

Wise land use

To produce various crops where they are best adapted is wise use of land. In general, keep steep, eroded, or poorly drained cropland in sod and plow only when reseeding is necessary. Keep moderately sloping fields in sod at least half of the time, and use the flattest and best fields for more intensive production of cultivated crops.

Soil and to Manage Water

You Always Need

Adequate cover

Soil covered with grass, or other close-growing crops, is protected from the impact of falling raindrops and there is little erosion or leaching. Because bare soil takes a beating, keep it covered as much of the time as possible. If you grow row crops, obtain some cover by: good farming that encourages rapid plant growth, by winter cover crops, or by top-dressing with manure or mulch.

Enough plant nutrients

Plant food is needed to produce profitable crops and also to grow plants that provide cover and organic matter. Supply this plant food by the use of commercial fertilizer and manure and by growing legumes. Many soils need lime also.

You Frequently Need

Contour farming

A line that is level from end to end is a contour line. Contour farming is plowing, planting, and cultivating across the slope and curving, where necessary, to follow the contour. Each contour row is a small dam that slows the speed of runoff water and reduces erosion. On well-drained soils and gentle slopes, contour farming may be the only mechanical measure needed.

Contour strip-corpping

Strip-cropping is plowing every other strip on the contour and leaving the alternate strips in sod. When you reseed the plowed strips, you may plow the sod strips. Because the sod strips conserve soil and water, strip-cropping is used where contour farming is not enough. On long slopes or on imperfectly drained soil, strip-cropping is frequently used in combination with diversion terraces.

You Frequently Need

Diversion terraces

A diversion terrace is an eaves trough across a slope to intercept runoff or seepage water. It is a broad, shallow channel, usually constructed with heavy earth-moving equipment. A uniform channel grade is required, therefore surveying equipment is needed to locate the diversions. For satisfactory operations, diversion terraces need an outlet. Both the design and the location of the outlet are important.

Sod waterways

Water concentrates in depressions and healed gullies that cross cultivated fields during hard storms. Such areas are protected by a permanent sod cover. To maintain a permanent sod, raise the tillage implements when crossing the depression. Sod waterway, properly maintained and fertilized, may sometimes be used as outlets for diversion terraces.

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